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09/744,212	03/07/2001	Jyoti Kiron Bhardwaj	WLJ.071	4027

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EXAMINER

DEO, DUY VU NGUYEN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 08/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/744,212

Applicant(s)

BHARDWAJ, JYOTI KIRON

Examiner

DuyVu n Deo

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 13-38 is/are rejected.
- 7) ☒ Claim(s) 11, 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 37, 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Seaver et al. (US 4,748,043).

Seaver describes a vapour delivering apparatus comprising a plate 14 which is covered with insulating film (claimed dielectric body) within which are positioned a plurality of needles (or nozzles), each needle extending from the back to the front side of the plate, the needles is stainless steel (claim body is metallized) to form a continuous electrical path between the back to the inside and to the tip of each needle (col. 4). This would read on claimed a continuous metallic layer covering the back side of the dielectric plate and side walls of the apertures and terminating through each aperture at eh front side of the plate. The apparatus comprises electrical connections from a high voltage supply (power supply) to the needles.

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***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-10, 13-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laermer et al. (US 5,501,893) and admitted prior art.

Laermer describes an etching method for comprising repeatedly performing the steps: etching a material using a plasma (col. 3, line 68); depositing a passivation layer on the surface of the etched feature (col. 4, line 26). The etching step includes selectively removing the passivation layer from the base of the etched feature in order that the etching proceeds in a direction perpendicular to the material (col. 4, line 54-56). This would read on claimed partially removing the passivation from the surfaces of the etched feature in order the etching of subsequent etching process cycles proceeds in a direction substantially perpendicular to the film surface. Unlike claimed invention, Laermer doesn't describe at least one of steps etching and depositing is performed in the absent of a plasma. However, other alternative ways of etching such as wet or vapor etching, using HF and alcohol, and depositing such as a plasma or energetic radiation (absent of plasma) is well known to one skilled in the art as discussed in pages 1, 3, and 4 of the specification. Therefore, at the time of the invention, using other technique for etching including wet, vapor etching or depositing such as energetic radiation (absent of plasma or

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photo-enhanced polymerization) would have been obvious in order to etch a substrate and deposit a passivation layer with a reasonable expectation of success.

Referring to claim 13, using nitrogen for purging between steps or as a gas carrier is well known to one skill in the art (please see cited arts below).

Referring to claim 16, the polymer would be of the formula since the gases using contains C and F such as  $\text{CHF}_3$  (claimed precursor). Referring to claim 18-20, page 4 of specification further describes the photo-enhance polymerization and by means of irradiation which are known and practiced by one skilled in the art. Referring to claims 21, 23, the ion energy such as 10eV would have been obvious to be determined through test runs and the etching gases (col. 6, line 11-20) would be capable of physically removing the passivation layer with chemical enhancement.

5. Claims 27-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laermer et al. (US 5,501,893).

Laermer describes an apparatus for processing a substrate comprising a chamber having a chemical inlet 22 (figure 1); a support 12 (claimed first electrode) for receiving a substrate (figure 1); means for etching (col. 4, line 1-25); means for depositing a passivation layer (col. 4, line 25-32); and means for selectively removing the passivation layer from the etched feature (col. 5, line 36-54). Even though Laermer is silent about the chemical outlet; however, there must be a chemical outlet in order to remove the chemical and product reaction from the etching and deposition.

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The apparatus comprises means for providing microwave or RF energy to the plasma (col. 4, line 1-11), electrical bias is provided to the support to accelerate ions onto the substrate (col. 4, line 7-15), and mean for controlling substrate T (col. 5, line 65-col. 6, line 10).

Since the apparatus described above having the same features as that of the claimed invention, these features would enable to performing repeatedly performing etching and depositing on a material surface as that of the claim.

6. Claims 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seaver et al. (US 4,748,043).

Seaver describes an electrospray coating process wherein he describes feeding a solution into the chamber by creating droplets on entering the chamber, and generating an electrostatic field to electrostatically attract the droplets to the substrate. The droplets are provided with a charge by means of high voltage power supply connected to a droplet inlet point (col. 5). Unlike claimed invention, Seaver doesn't describe a solution for etching; however, it would be obvious that depending on the solution being used, the method can be for etching. Therefore, it would have been obvious at the time of the invention for one skilled in the art that depending on the step of the process being done, the method can be used for etching in order to provide a substrate with a reasonable expectation of success.

Referring to claim 36, since the electrostatic field strength is a result-effective variable, it would have been obvious for one skilled in the art to determine the strength of the field through routine experimentation in order to achieve the optimum strength for attraction of the droplets to the substrate a reasonable expectation of success.

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7. Blackwood et al. (US 4,749,440), col. 4, line 68-col. 5, line 2, and Cleavelin et al. (Semiconductor International Nov. 1987), pg 96, are cited to show prior art.

***Response to Arguments***

8. Applicant's arguments filed 6/24/03 have been fully considered but they are not persuasive.

Referring to applicant's argument that Laermer doesn't describe a step of partially removing the passivation layer within each etching process cycle. The etching step, as described by Laermer, includes removing the passivation layer from the base of the etched feature in order that the etching proceeds in a direction perpendicular to the material (col. 4, line 54-56). This would read on claimed step of partially removing the passivation from the surfaces of the etched feature in order the etching of subsequent etching process cycles proceeds in a direction substantially perpendicular to the film surface. As the etching step is repeated during the next cycle, it would also include partially removing the passivation in each process cycle.

Applicant's argument that Laermer describes that the polymer is broken by the ion support is acknowledged. However, he doesn't teach against using other alternative etching techniques that are available and known to one skill in the art such as wet or vapor etching, using HF and alcohol. Also, the claim describes either the etching or the depositing step is performed in the absent of the plasma. Depositing technique such as energetic radiation (absent of plasma) is well known to one skilled in the art as discussed in pages 1, 3, and 4 of the specification. therefore, using any of these equivalent techniques would produce claimed invention with a reasonable expectation of success.

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Applicant's argument concerning about claims 27-33 is found unpersuasive because claims 27-33 are apparatus claims and the argument does not concern anything about features of the apparatus but steps of performing a process. Since the reference has the same features of an apparatus as that of the claimed invention, it would be able to perform a same process.

Referring to applicant's argument about claims 37 and 38, Seaver describes a plurality of needles (or nozzles), each needle extending from the back to the front side of the plate, the needles is stainless steel (claim body is metallized) to form a continuous electrical path between the back to the inside and to the tip of each needle (col. 4). This would read on claimed a continuous metallic layer covering the back side of the dielectric plate and side walls of the apertures and terminating through each aperture at the front side of the plate.

Applicant's argument that Seaver's coating head would not be suitable for use in a etching environment is found unpersuasive because there are no facts to show this is the case. In general, an etching apparatus can be used as a coating (deposition) apparatus. It depends on the type of chemical being used. Since Seaver doesn't teach against etching, it would be obvious to one skill in the art that depending on what step of the process being done, the method can be used for etching in order to provide a substrate with a reasonable expectation of success.

***Claim Rejections - 35 USC § 112***

9. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claims 27, 33 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not



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described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant has not shown where in the specification teaching of the apparatus comprising means for repeatedly performing an etching process cycle, wherein each etching process cycle increases a depth of an etched feature in the material or film, and wherein each etching process cycle carried out by said means includes...in direction substantially perpendicular to the material or film surface.

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 27 and 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 27 and 33 are vague and indefinite because applicant has not clarified what the means for repeatedly performing an etching process cycle are.

Claims 27 and 33 are vague and indefinite because apparatus cannot be defined by process steps. A single claim which claims both an apparatus and the method steps of using the apparatus is indefinite. In *Ex Parte Lyell*, 17 USPQ2d 1548 (Bd. Pat. App. & Inter. 1990).

***Allowable Subject Matter***

13. Claims 11-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Claims 11, 12 are allowable because applied prior art doesn't suggest that material or film being etched is a conductor, preferably an Au or Pt conductor. Primary reference, Laermer, describes etching silicon.

***Conclusion***

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD  
August 19, 2003

**NADINE G. NORTON**  
**PRIMARY EXAMINER**

